

### **3.0 SUMMARY OF PREVIOUS INVESTIGATIONS**

Several investigations have been conducted by the USACE and its contractors both upland and in the Columbia River to evaluate the environmental impacts from the inactive Bradford Island landfill and to support the operation mission of the Bonneville Lock and Dam complex.

#### **3.1 UPLAND INVESTIGATIONS BY CONTRACTORS**

Three upland investigations into the environmental conditions of the Bradford Island Landfill have occurred over the last four years. Previous investigation reports for the upland areas of the landfill include the site inspection (SI) (Tetra Tech, 1998), the supplemental site inspection (SSI) (URS, 1999), and the site characterization report (URS, 2002).

The site characterization report provides a summary of the previous investigations and indicated that a total of 9,900 cubic yards of landfill debris are present on the northeast portion of Bradford Island. The debris is present from the near surface to a depth of 10 feet below ground surface (bgs). Debris is also present on the north and east slopes near the landfill. Figure 3-1 depicts the footprint of the landfill and groundwater monitoring well locations.

Analytical results from groundwater beneath Bradford Island landfill identified relatively low levels of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), petroleum hydrocarbons, butyltins, and metals (URS, 2002).

Analytical results of surface and subsurface soil samples collected from the site show relatively low concentrations of VOCs, SVOCs, metals, herbicides, and pesticides, and PCBs (URS, 2002).

Other upland investigations have been conducted on Bradford Island near the Sandblast Building. Analytical results of surface and subsurface soil samples collected near the Sandblast Building and hazardous waste storage area show elevated levels of lead and chromium. VOCs and SVOCs were reported in one additional location. Groundwater samples have not been collected from this area.

#### **3.2 DREDGE EVALUATIONS & OTHER STUDIES BY USACE**

Four studies (two published reports and two unpublished evaluations) were completed to evaluate sediment dredging within the area. Appendix B contains copies of the reports or analytical chemistry results. The studies are summarized here.

##### Bonneville Navigation Lock Sediment Evaluation – 1991

The downstream area below the old navigation lock was dredged infrequently. The most recent event in 1986 removed 2,050 yards of material. Two samples were collected within the area directly downstream of the navigation lock using a ponar sampler and a third sample was collected downstream of the tip of Bradford Island. The third sample was collected to characterize a potential site for in-water disposal of the dredged sediments, and chemical analysis was not completed. The navigation lock samples were submitted for the following analyses:

grain-size, organic content, metals, volatile solids, pesticides, polycyclic aromatic hydrocarbons (PAHs), and PCBs.

The two samples within the navigation lock channel were silty sands with gravel or clay, dependant upon the location. The sample downstream of Bradford Island was reported to be a well-graded gravel.

The results indicated that low levels of metals were reported above detection limits, with pesticides, PCBs, and PAHs were not detected above the reporting limits. Appendix B contains a copy of the sediment evaluation report. The sample locations and PCB results are depicted on Figure 3-2.

### Minimum Operating Pool Study – 1991

A Minimum Operating Pool (MOP) study was conducted within the Bonneville Pool. The study included twelve (12) sites between river miles 149 and 181. All sites were analyzed for metals, PAHs, pesticides/PCBs, total organic carbon (TOC) and acid volatile sulfides (AVS). Some sites were also analyzed for phenols, dioxins/furans and tributyltin (TBT). None of the test sediments exceeded the *Dredge Material Evaluation Framework* (DMEF) screening guidelines at the time for open water disposal (no PCBs were detected at or above the method reporting limit (MRL) of 0.04 milligrams per kilogram [mg/kg]). Appendix B contains a copy of the pool study report.

### Bonneville Second Powerhouse Forebay Sediment Evaluation – 1997

Due to debris buildup from high water events in 1996, seven sediment samples were collected from the second powerhouse forebay and from within the auxiliary water supply (AWS) conduits in the second powerhouse. Two samples were collected from within the AWS conduits by divers, three surface sediment samples were collected from the north end of the forebay, and two additional samples were collected from sediment that had been recently removed from the AWS intake trash rack.

The samples were submitted for physical and chemical analysis. The results indicated the sediments collected consisted mostly of sand-sized particles, and consequently low TOC concentrations were detected. Low levels of metals, select PAHs, lindane and DDT were reported. PCBs as Aroclors were not detected above the reporting limits. Appendix B contains a copy of the sediment evaluation report. The sample locations and PCB results are depicted on Figure 3-2.

### Bradford Island Fish Ladder Exit Sampling – 2001

Prior to dredging sediments that had been deposited at the exit of the fish ladder on Bradford Island, three surface samples were collected from the area in December 2001. The samples were collected to determine disposal options for the dredged materials. The samples were submitted for chemical laboratory analysis for PCBs and organochlorine pesticides by EPA method 8081. The analytical results indicated that none of the parameters were detected above the method reporting limits. Appendix B contains a copy of the analytical chemistry report. The approximate sample locations and PCB results are depicted on Figure 3-2.

### 3.3 PILE #1-PARTIAL REMOVAL– DECEMBER 2000

In December 2000, approximately 60 electrical items were removed from the eastern-most pile (Pile #1) proximate to Bradford Island. Items recovered from the pile included post insulators, lightning arrestors, electrical panels, and one inerteen capacitor. Due to adverse weather conditions, the removal efforts were suspended prior to recovery of all electrical items from the river.

Four sediment samples were collected during the recovery activities. Two samples were collected near the area where the inerteen capacitor was recovered (one beneath the capacitor and one approximately 10 feet from the capacitor). A third sample was recovered from a 5-inch round disk that had fallen out of a broken lightning arrestor. The fourth sample was collected from the back of an electrical panel.

The disk and the back of the panel had acted as a sediment trap, therefore these samples consisted mostly of fine sands and silt sized particles. The other two samples that were collected from the riverbed consisted mostly of medium sized sands, since the sampling method (diver) could not recover the finer grained material from these areas.

Each sediment sample collected was submitted for analysis for PCBs by EPA Method 8082, Total Organic Carbon by EPA Method 9060, and petroleum hydrocarbons by Method NWTPH-Dx.

PCBs as Aroclor 1254 were detected above the reporting limit in three samples ranging from 0.15 mg/kg to 8.3 mg/kg. Petroleum hydrocarbons were not detected above reporting limits. The Sediment TOC vales ranged from 370 mg/kg to 10,000 mg/kg.

A technical memorandum that describes the sampling and analysis details was provided as an appendix in the URS document *In-Water Investigation Report, Bradford Island Landfill* (URS, 2002). The sample locations and PCB concentrations are depicted on Figure 3-2.

### 3.4 IN-WATER INVESTIGATION – MAY 2001

In May 2001, an additional investigation was conducted to further characterize the area surrounding the underwater debris, and to support evaluation of options for additional debris removal activities. The investigation included sampling several matrices in the area surrounding the debris piles, a detailed survey of the offshore areas proximate to the landfill, and an estimate of the volume of debris located in the river.

The survey confirmed the presence of the two most upstream debris piles in the Columbia River, near the landfill and located one additional pile downstream near the access road that leads to the landfill. Waste items were also observed on the surface of the bedrock outcrops on Bradford Island and down the slopes to the water level. These observations support the anecdotal accounts that the materials on the shore and in the water adjacent to the landfill were disposed in the water following storage on the surface of the landfill.

The piles consisted of electrical equipment and miscellaneous debris (primarily wire rope). Sampling consisted of the collection of sediment, tissue and water column samples. Sediment samples were collected within and on the perimeter of two of the debris piles.

The samples contained concentrations of PCBs, metals and SVOCs above selected ecological benchmark screening values. PCBs in sediments were detected at concentrations ranging from non-detect to 23.9 mg/kg. Clams and crayfish collected in the debris piles exhibited PCB concentrations above background results. Sample results from Semi-Permeable Membrane Devices (SPMDs) indicated that PCBs as Aroclors were not detected in the dialysate above reporting limits.

The investigation method details and analytical results were summarized in the URS document *In Water Investigation Report, Bradford Island Landfill, March 2002*. The sample locations and PCB concentrations are depicted on Figure 3-2.

### 3.5 FIRST POWERHOUSE TRASHBOOM SEDIMENT EVALUATION – JANUARY 2002

The first powerhouse forebay south of Bradford Island is the proposed location for a new trashboom. Installation of the concrete anchors required to hold the trashboom in place will require excavation of the Columbia River sediments. URS collected twelve sediment samples at four locations identified by the USACE as possible anchor points (three at each location). Figure 3-2 depicts the sample locations and PCB concentrations.

A gravity core sampler was used to collect sediment at Anchor Point #1 (nearest to the old navigation lock). Due to the lack of sample recovery, a clamshell bucket sampler was utilized to obtain river sediment samples at the three remaining sample locations. Adequate sample media was obtained at each location, and the samples were submitted for chemical analysis.

The analytical results indicate that PCB Aroclors were below the practical quantitation limit (PQL) at all four anchor point locations. Two samples contained levels of mercury above the stated NOAA Freshwater Sediment TEL, both occurring at Anchor Point #4, which is located off the Bradford Island south shoreline. Motor oil range hydrocarbons were also detected in several samples in both Anchor Points #1 and #4. There is no established TEL for motor oil. Gasoline and #2 diesel were also below the PQL at all sample locations.

The results of the total organic carbon and grain size analysis revealed that the sediments sampled consist primarily of sandy silts with some clay. Surficial fine gravels were also encountered at Anchor Points #2 and #3. The sediment fraction of TOC ranged from 0.16 percent to 1.4 percent.

The investigation method details and analytical results were summarized in the URS document *Trashboom Structure Foundation Anchor Sediment Sampling Report, Bonneville Dam Project, March 2002*.

### 3.6 OFF-SHORE DEBRIS REMOVAL– MARCH 2002

The May 2001 investigation concluded that the offshore electrical equipment items in the debris piles in the river may represent an ongoing human or ecological risk, and that the electrical equipment should be removed as soon as possible (URS, 2002a). Electrical and other solid waste was removed from the river and shoreline of Bradford Island between February 14 and March 4, 2002.

Divers were used to locate the electrical items and any other solid waste located within the three identified areas. Additionally, solid waste items (primarily wire rope) located upland from Pile #1 and Pile #2 (located near the landfill, on the steep slopes below it) were removed. The USACE also conducted a limited sediment removal effort in areas where PCB-containing oils may have been released.

A total of 32 tons of solid waste was removed and disposed of at an appropriate offsite facility. The PCB containing electrical debris that was recovered filled four 55-gallon drums. Seven 55-gallon drums of sediment and water were generated. PCBs as Aroclor 1242 and 1248 were detected in the sediments that were removed up to 6,470 mg/kg. The debris, sediment, and water were transported off-site by USACE for disposal.

PCBs, as Aroclor 1254, were detected in the water column in the particulate phase during the recovery activities up to 0.0218 µg/L, and up to 0.0308 µg/L in the dissolved phase. Additionally, PCBs as Aroclor 1260 were detected at 0.0347 µg/L in the particulate phase.

The investigation method details and analytical results were summarized in the URS document *Technical Memorandum, In-Water Removal Work, Bradford Island Landfill, Cascade Locks, Oregon, October 2002*. Figure 3-3 depicts the locations of the former waste piles and sediment removal area.

### 3.7 BONNEVILLE FOREBAY CHARACTERIZATION – AUGUST 2002

In August 2002, the USACE collected sediment samples from the Bonneville Pool between and dam and River Mile 147 to gather baseline data regarding potential upstream contribution of contaminants to the sediments in this area. The USACE attempted to sample sediment at 24 stations using a box core sampling device. Fine-grained sediments were able to be collected at six of the 24 stations. The box core device could not collect fines at the remaining locations. Samples were analyzed for grain size, TOC, metals, PCBs, and SVOCs. Low levels of metals and SVOCs were detected above the reporting limit at several locations throughout the forebay. PCBs, as Aroclor 1254, were detected at one station on the south side of Bradford Island at 0.0192 mg/kg. TOC results ranged from 0.2% to 1.6%. The analytical chemistry results are summarized in a table provided in Appendix B. Figure 3-2 depicts the PCB sample locations and results.